

NEW ENGLAND NOTE

DISCOVERY OF TWO NEW *LYCOPODIELLA*
(LYCOPODIACEAE) IN MAINE

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Lycopodiella Holub is a distinctive genus of wetland club-mosses. Species of this genus have creeping horizontal stems and upright, unbranched, leafy peduncles each of which may bear a single strobilus. Leaves of both the peduncle and strobilus (sporophylls) are unreduced and morphologically similar to the leaves of the horizontal stem, traits unusual in the family. The genus includes six species in North America, four widespread diploids and two tetraploids of global conservation concern (Wagner and Beitel 1993). Interspecific hybrids are common (Bruce 1975), and plants resulting from crosses between species of the same ploidy level are generally fertile, with normal spores, whereas those from crosses between species of different ploidy levels are sterile and produce aborted spores.

Three species of *Lycopodiella* occur in New England: *L. alopecuroides* (L.) Cranfill; *L. appressa* (Chapm.) Cranfill; and *L. inundata* (L.) Holub (Angelo and Boufford 1996). The former two species are found primarily on the Atlantic coastal plain and are more common south of New England. The latter species is a north temperate and boreal plant of North America and Eurasia. Both *L. appressa* and *L. inundata* are reported to occur in Maine (Angelo and Boufford 1996; Haines and Vining 1998), although *L. appressa* is currently ranked state historic (i.e., not observed extant in 20 years) by the Maine Natural Areas Program (1999).

Recognition of New England *Lycopodiella* is generally not problematic except where hybrid individuals complicate identification. *Lycopodiella inundata* is a small plant with upright shoots rarely taller than 6 cm. Its strobilus has spreading, entire sporophylls and commonly comprises 35–50% of the upright shoot height. *Lycopodiella appressa* is a taller plant with upright shoots 13–40 cm tall. Its strobilus has appressed, entire sporophylls commonly comprising 15–35% of the total upright shoot height. *Ly-*

copodiella alopecuroides, similar to the preceding species, is also a relatively robust bog clubmoss. Its upright shoots are 6–30 cm tall, of which the strobilus commonly comprises 15–35% of the total height. The sporophylls are spreading and provided with minute teeth on each margin. *Lycopodiella alopecuroides* has an unusual growth habit. The horizontal stems arch over the substrate and root at distant points where the stem contacts the ground. Both *L. inundata* and *L. appressa* have horizontal stems that are normally flat on the ground and root along the length. The reader is directed to Wagner and Beitel (1993) and Montgomery and Fairbrothers (1992) for additional characteristics that distinguish these three species of bog clubmoss.

On 29 November 2000, I conducted a preliminary rare plant and natural community survey on a property in Topsham, Sagadahoc County. Two open power-line clearings occurred on this property that have recovered as mixed graminoid–shrub wetlands in the low areas. These wetlands occur on saturated, sandy soils overlaid by a layer of organic matter and high bryophyte cover. Within one of these wetlands, a robust *Lycopodiella* with upright shoots exceeding 10 cm in height was observed. It had thick, arching horizontal stems, and leaves with minute teeth. Identification confirmed the small colony as a *L. alopecuroides* population of approximately six individuals. Species associated with the population included *Muhlenbergia uniflora* (Muhl.) Fernald, *Kalmia angustifolia* L., *Rhynchospora capitellata* (Michx.) Vahl, *Rubus hispidus* L., *Spiraea tomentosa* L., *Solidago uliginosa* Nutt., *Eriophorum virginicum* L., *Gentiana linearis* Froel., and *Lycopodiella inundata*.

A search of the area revealed a second colony of large *Lycopodiella* plants growing five meters from the previous location. The colony was substantially larger and grew across and along the edge of an infrequently used off-road vehicle path within the mixed graminoid–shrub wetland. Further examination revealed these plants as hybrids of *L. alopecuroides* and *L. inundata*. These hybrid plants exhibited the thick, arching stems of *L. alopecuroides* with the relatively tall strobili (35–46% of the total upright shoot height) of *L. inundata*. This morphology is similar to that observed in other *L. alopecuroides* × *L. inundata* occurrences of eastern North America (Montgomery and Fairbrothers 1992). The presence of hybrid plants is not surprising given the reproductive biology of *Lycopodiella* (i.e., frequency of hybridization in mixed

populations) and the abundance of *L. inundata* in the wetland. Neither *L. alopecuroides* nor its hybrid with *L. inundata* have been collected previously in Maine. Within New England, *L. alopecuroides* × *L. inundata* has only been reported for Massachusetts (Sorrie and Somers 1999). High-resolution digital scans of the collected plants were provided to James Montgomery to confirm species identification. Rare species report forms have been forwarded to the Maine Natural Areas Program and specimens of both taxa have been deposited in the University of Maine Herbarium.

Lycopodiella alopecuroides L. Cranfill. Sagadahoc Co.: Topsham, 29 Nov 2000, Haines s.n. (MAINE).

Lycopodiella alopecuroides × *L. inundata*. Sagadahoc Co.: Topsham, 29 Nov 2000, Haines s.n. (MAINE).

Prior to the November survey, the global range of *Lycopodiella alopecuroides* was reported to be Massachusetts, south along the coastal plain to Florida, and west to southeastern Texas, with disjunct occurrences in central Texas, Arkansas, and Kentucky (Wagner and Beitel 1993). This surprising discovery represents a range expansion of approximately 250 km north from the nearest known population in Winchendon, Worcester County, Massachusetts (Paul Somers, pers. comm.). In New England, *L. alopecuroides* is a *Flora Conservanda* Division 2 species (fewer than 20 New England occurrences; Brumback and Mehrhoff, et al. 1996) and therefore of regional conservation concern. In Massachusetts, it is provided a state status of endangered (Massachusetts Natural Heritage and Endangered Species Program 2000). In Connecticut, it has a state status of special concern, though it is believed extirpated (Connecticut Department of Environmental Protection 1998). In Rhode Island, it is given a state status of endangered (Brumback and Mehrhoff, et al. 1996).

Given its regional rarity, protection of the Maine station is a high priority for this species in New England. Prompt conservation action is suggested as vehicular traffic is currently damaging the hybrid plants proximate to the *Lycopodiella alopecuroides* colony. Maintenance of an open community for the power lines is likely to be beneficial to the survival of these plants. Future transmission-line tower repairs, however, could threaten the plants if heavy machinery is not routed around the colonies.

Coordination with Central Maine Power Company is crucial to the long-term survival of the *L. alopecuroides* occurrence.

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